

=> FILE REG

FILE 'REGISTRY' ENTERED AT 19:33:14 ON 16 DEC 2008  
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=> DISPLAY HISTORY FULL L1-

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FILE 'REGISTRY' ENTERED AT 19:13:35 ON 16 DEC 2008
      E SULFURIC ACID/CN
L1      1 SEA "SULFURIC ACID"/CN
      E SULFUR DIOXIDE/CN
L2      1 SEA "SULFUR DIOXIDE"/CN
      E OXYGEN/CN
L3      1 SEA OXYGEN/CN
      E SULFUR TRIOXIDE/CN
L4      1 SEA "SULFUR TRIOXIDE"/CN

FILE 'HCA' ENTERED AT 19:20:59 ON 16 DEC 2008
L5      12490 SEA L1/P
L6      10959 SEA L2 (L) RACT/RL
L7      63736 SEA L3 (L) RACT/RL
L8      43002 SEA L4 OR (SULFUR# OR SULPHUR# OR SULFER# OR SULPHER#) (W)
      TRIOXIDE# OR SO3
L9      77860 SEA UPSTREAM?
L10     1357 SEA CONTACT?(2A) (STAGE# OR STAGING#)
L11     7891 SEA (MAIN# OR PRIMAR? OR PRINCIPAL?) (2A) (CONTACT? OR
      STAGE# OR STAGING#)
L12     1310206 SEA ABSORB? OR ABSORP?
L13     25186 SEA (GAS## OR GASEOUS? OR GASIF?) (2A) (FED OR FEED?) OR
      FEEDGAS?
L14     170 SEA PRECONTACT? OR PRE(W)CONTACT?
L15     1388 SEA DAUM ?/AU
L16     3953 SEA SEITZ ?/AU
L17     94065 SEA MULLER ?/AU OR MUELLER ?/AU
L18     68 SEA ANASTASIJEVIC ?/AU
L19     1 SEA L15 AND L16 AND L17 AND L18
L20     2962 SEA CONTACT?(2A) STEP?
L21     5881 SEA (MAIN# OR PRIMAR? OR PRINCIPAL?) (2A) STEP?
L22     35 SEA L5 AND L6 AND L7
L23     25 SEA L22 AND ((L8 OR L9 OR L10 OR L11 OR L12 OR L13) OR
      L14 OR L20 OR L21)
      SET ROLES TEXT
L24     10 SEA L22 NOT L23
L25     16 SEA 1808-2002/PY,PRY,AY AND L23
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=> FILE HCA

FILE 'HCA' ENTERED AT 19:33:31 ON 16 DEC 2008  
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.  
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=> D L25 1-16 BIB ABS HITSTR HITIND

L25 ANSWER 1 OF 16 HCA COPYRIGHT 2008 ACS on STN

AN 140:359745 HCA Full-text

TI Procedure and device for the production of sulfuric acid from sulfur dioxide-rich gases

IN Daum, Karl-Heinz; Mueller, Hermann; Seitz, Ekkehard; Anastasijevic, Nikola

PA Outokumpu Oyj, Finland

SO Ger. Offen., 26 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO. ----- -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
PI	DE 10249782	A1	20040506	DE 2002-10249782	200210 24
				<--	
TW	250125	B	20060301	TW 2003-92128992	200310 20
				<--	
CA	2503221	A1	20040506	CA 2003-2503221	200310 21
				<--	
WO	2004037719	A1	20040506	WO 2003-EP11659	200310 21
				<--	
W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,				

				CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW		
	RW:			GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG		
AU	2003274054	A1	20040513	AU	2003-274054	200310 21
					<--	
BR	2003015534	A	20050823	BR	2003-15534	200310 21
					<--	
EP	1565402	A1	20050824	EP	2003-758033	200310 21
					<--	
	R:				AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK	
CN	1708453	A	20051214	CN	2003-80102005	200310 21
					<--	
JP	2006503782	T	20060202	JP	2004-545919	200310 21
					<--	
IN	2005MN00302	A	20051202	IN	2005-MN302	200504 19
					<--	
MX	2005PA04226	A	20050608	MX	2005-PA4226	200504 20
					<--	
US	20060245997	A1	20061102	US	2005-532326	200504 22
					<--	
PRAI	DE 2002-10249782	A	20021024		<--	

WO 2003-EP11659 W 20031021

- AB H<sub>2</sub>SO<sub>4</sub> is produced by (1) catalytic oxidn. of SO<sub>2</sub> with O<sub>2</sub> in >2 successively connected **contact steps** to give SO<sub>3</sub>, and (2) **absorption** of the resulting SO<sub>3</sub> in an **absorber**. A partial flow contg. SO<sub>2</sub> and SO<sub>3</sub> is discharged from the last **contact step** followed by mixing the flow with a waste gas to obtain a contact gas contg. >13% SO<sub>2</sub> that is recycled into the first **contact step**.
- IT 7664-93-9P, Sulfuric acid, preparation  
RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)  
(procedure and plant for prodn. of sulfuric acid from sulfur dioxide-rich gases)
- RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



- IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7, Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(procedure and plant for prodn. of sulfuric acid from sulfur dioxide-rich gases)
- RN 7446-09-5 HCA  
CN Sulfur dioxide (CA INDEX NAME)



- RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)



- IT 7446-11-9P, Sulfur trioxide, preparation  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(procedure and plant for prodn. of sulfuric acid from sulfur dioxide-rich gases)

RN 7446-11-9 HCA  
CN Sulfur trioxide (CA INDEX NAME)



IC ICM C01B017-765  
CC 49-2 (Industrial Inorganic Chemicals)  
ST sulfuric acid prodn sulfur trioxide  
absorption; sulfur dioxide catalytic oxidn oxygen  
IT Oxidation  
(catalytic; of sulfur dioxide in contact step  
, for prodn. of sulfuric acid by)  
IT Absorption  
(of sulfur trioxide, for prodn. of sulfuric acid from sulfur dioxide-rich gases)  
IT 7664-93-9F, Sulfuric acid, preparation  
RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)  
(procedure and plant for prodn. of sulfuric acid from sulfur dioxide-rich gases)  
IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7, Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(procedure and plant for prodn. of sulfuric acid from sulfur dioxide-rich gases)  
IT 7446-11-9F, Sulfur trioxide, preparation  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(procedure and plant for prodn. of sulfuric acid from sulfur dioxide-rich gases)  
L25 ANSWER 2 OF 16 HCA COPYRIGHT 2008 ACS on STN  
AN 138:257330 HCA Full-text  
TI Manufacture of oleum and sulfuric acid by low-temperature spray combustion of sulfur  
IN Eichenhofer, Kurt-Wilhelm; Grabowski, Klaus-Peter; Draeger, Guenter; Kuerten, Martin; Schweitzer, Martin  
PA Bayer AG, Germany  
SO Ger. Offen., 12 pp.  
CODEN: GWXXBX  
DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	
PI	DE 10143176	A1	20030320	DE 2001-10143176	200109 04
				<--	
	EP 1295849	A2	20030326	EP 2002-18250	200208 22
				<--	
	EP 1295849	A3	20031126		
	EP 1295849	B1	20060712		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, SK				
	AT 332874	T	20060815	AT 2002-18250	200208 22
				<--	
	ES 2267906	T3	20070316	ES 2002-18250	200208 22
				<--	
	JP 2003089509	A	20030328	JP 2002-250364	200208 29
				<--	
	US 20030077217	A1	20030424	US 2002-230835	200208 29
				<--	
	US 6893622	B2	20050517		
	CA 2401263	A1	20030304	CA 2002-2401263	200209 03
				<--	
PRAI	DE 2001-10143176	A	20010904	<--	
AB	Oleum having a SO <sub>3</sub> concn. of 10-45 wt.% and 94-100 wt.% H <sub>2</sub> SO <sub>4</sub> are produced by (1) hyper-stoichiometric combustion of S with atm. O <sub>2</sub> , (2) cooling the resulting SO <sub>2</sub> -contg. gases at 350°-500°, (3) catalytic conversion the cooled SO <sub>2</sub> -contg. gases to SO <sub>3</sub> -contg. gases in the presence of a V catalyst by single- or double-contact catalysis, (4) <b>absorbing</b> the SO <sub>3</sub> -contg. gases after cooling, and (5) sepn. of liqs. and energy recovery. The liq. S is sprayed vertically in the hot combustion flow by using bimodal fan nozzles. The				

disclosed method reduces the NOHSO4 content and the serviceability costs caused by corrosion, and can be carrying out without (H2NNH2)2.H2SO4 soln.

IT 7446-09-5P, Sulfur dioxide, preparation  
RL: CPS (Chemical process); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); RCT (Reactant); PREP (Preparation); PROC (Process); ~~RACT (Reactant or reagent)~~  
(for low-temp. combustion of sulfur for prodn. of oleum and sulfuric acid)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (CA INDEX NAME)



IT 7782-44-7, Oxygen, reactions  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); ~~RACT (Reactant or reagent)~~  
(for low-temp. combustion of sulfur for prodn. of oleum and sulfuric acid)  
RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)



IT 7664-93-9P, Sulfuric acid, preparation  
RL: CPS (Chemical process); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)  
(manuf. of oleum and sulfuric acid by low-temp. spray combustion of sulfur)  
RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



IC ICM C01B017-69  
 CC 49-2 (Industrial Inorganic Chemicals)  
 IT 124-38-9P, Carbon dioxide, preparation 630-08-0P, Carbon monoxide,  
 preparation 7446-09-5P, Sulfur dioxide, preparation  
 7727-37-9P, Nitrogen, preparation 11104-93-1P, NOx, preparation  
 RL: CPS (Chemical process); IMF (Industrial manufacture); PEP  
 (Physical, engineering or chemical process); RCT (Reactant); PREP  
 (Preparation); PROC (Process); **RACT** (Reactant or reagent)  
 (for low-temp. combustion of sulfur for prodn. of oleum and  
 sulfuric acid)  
 IT 7782-44-7, Oxygen, reactions  
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical  
 process); RCT (Reactant); PROC (Process); **RACT** (Reactant or  
 reagent)  
 (for low-temp. combustion of sulfur for prodn. of oleum and  
 sulfuric acid)  
 IT 7664-93-9P, Sulfuric acid, preparation 8014-95-7P, Oleum  
 RL: CPS (Chemical process); IMF (Industrial manufacture); PEP  
 (Physical, engineering or chemical process); PREP (Preparation);  
 PROC (Process)  
 (manuf. of oleum and sulfuric acid by low-temp. spray combustion  
 of sulfur)

L25 ANSWER 3 OF 16 HCA COPYRIGHT 2008 ACS on STN  
 AN 138:240027 HCA Full-text  
 TI Process and plant for the conversion of SO2 into sulfuric acid  
 IN Fattinger, Volker; Jaeger, Walter  
 PA Fattinger Air Pollution Control AG, Switz.  
 SO S. African, 21 pp.  
 CODEN: SFXXAB

DT Patent  
 LA English  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	---	-----	-----	
PI	ZA 9906661	A	20000515	ZA 1999-6661	199910 22

<--

PRAI CH 1998-2147 A 19981023 <--  
 AB To lower the manuf. cost and recover the discharge gases, a process  
 combining a contact plant (KA) and a nitric oxide sulfuric acid plant  
 (SSA) is provided for manuf. of highly concd. sulfuric acid by  
 conversion of SO2. Water in the **feed gases** and/or process air of the  
 KA is **absorbed** with < 72% H2SO4 from the SSA, then, the water

absorbed < 65% H2SO4 is transferred to a SO2 absorption stage of the SSA. The dried discharge gas contg. SO2 and NOx from the KA is fed into the SSA for the recovery of concd. H2SO4. The discharge gases contain (SO2 and NOx ) <= 20 ppm.

IT 7664-93-9F, Sulphuric acid, preparation  
RL: PNU (Preparation, unclassified); PREP (Preparation)  
(process and plant for manuf. of concd. sulfuric acid)  
RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



IT 7782-44-7, Oxygen, reactions  
RL: RCT (Reactant); ~~RACT~~ (Reactant or reagent)  
(reactant for manuf. of concd. sulfuric acid)  
RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)



IT 7446-09-5, Sulfur dioxide, reactions  
RL: RCT (Reactant); ~~RACT~~ (Reactant or reagent)  
(reactant for manuf. of concd. sulfuric acid)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (CA INDEX NAME)



IC ICM B01D  
ICS C01B  
CC 49-2 (Industrial Inorganic Chemicals)  
ST sulfuric acid oleum sulfur oxide conversion; water  
absorption acid exchange discharge gas recovery  
IT 11104-93-1, Nitrogen oxide, processes  
RL: REM (Removal or disposal); PROC (Process)



BR 2000015265                    A                    20020618                    BR 2000-15265                    20001101

<--

EP 1230150	A1	20020814	EP 2000-975531
			200011 01

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                                <--
R:   AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,
      PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR
JP 2003517419           T           20030527       JP 2001-538282
                                                    200011
                                                    01

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ZA 2002002425                      A                      20030626                      ZA 2002-2425                      200203  
26

<--

MX 2002PA04408	A	20020902	MX 2002-PA4408
			200204 30

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PRAI US 1999-163061P      P      19991101  <--
WO 2000-US30095          W      20001101  <--
OS  MARPAT 134:369018
AB  A converted feed gas comprising a first portion of the SO2-enriched
stripper gas is formed. A conversion gas comprising SO3 and residual
SO2 is formed by passing the converted feed gas through a plurality
of catalyst beds in series, the plurality comprising at least 2 and
no greater than 4 catalyst beds. A second portion of the SO2-
enriched gas is introduced into at least one catalyst bed which is
downstream of the most upstream catalyst bed in the plurality to
fortify the SO2 concn. in the gas fed to the downstream bed. The
present invention is also directed to a process for making sulfuric
acid and/or oleum from a source gas comprising SO2. A conversion gas
comprising SO3 and residual SO2 is formed by passing the SO2-enriched
stripper gas through a plurality of catalyst beds in series. The
conversion gas is combined with water vapor to form an acid product
gas comprising: (a) sulfuric acid formed by a gas phase reaction
between SO3 from the conversion gas and water vapor, thereby
generating the heat of formation of sulfuric acid in the gas phase;
(b) SO3; and (c) SO2. Heat energy from the gas phase heat of
formation of sulfuric acid is recovered by transfer of heat from the
acid product gas to steam or feed water in an indirect heat
exchanger. The cooled acid product gas is then contacted with liq.

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sulfuric acid in an SO<sub>3</sub> absorption zone to form addnl. sulfuric acid and/or oleum and an SO<sub>3</sub>-depleted gas comprising SO<sub>2</sub>.

IT 7446-11-9F, Sulfur trioxide, preparation  
7664-93-9F, Sulfuric acid, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(method for prepg. sulfur trioxide, sulfuric acid, and oleum from sulfur dioxide)  
RN 7446-11-9 HCA  
CN Sulfur trioxide (CA INDEX NAME)



RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7, Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(method for prepg. sulfur trioxide, sulfuric acid, and oleum from sulfur dioxide)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (CA INDEX NAME)



RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)



IC ICM C01B017-765  
 CC 49-2 (Industrial Inorganic Chemicals)  
 Section cross-reference(s): 48  
 ST ~~sulfur trioxide~~ sulfuric acid oleum prepn sulfur  
 dioxide  
 IT Catalysts  
 Formation enthalpy  
 Heat exchangers  
 Heat transfer  
 Oxidation catalysts  
 (method for prepg. ~~sulfur trioxide~~, sulfuric  
 acid, and oleum from sulfur dioxide)  
 IT Heat  
 (recovery; method for prepg. ~~sulfur trioxide~~,  
 sulfuric acid, and oleum from sulfur dioxide)  
 IT 1314-62-1, Vanadium pentoxide, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (K-promoted; method for prepg. ~~sulfur trioxide~~  
 , sulfuric acid, and oleum from sulfur dioxide)  
 IT 7440-09-7, Potassium, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (V205 promoted with; method for prepg. ~~sulfur~~  
~~trioxide~~, sulfuric acid, and oleum from sulfur dioxide)  
 IT 7446-11-9P, ~~Sulfur trioxide~~, preparation  
 7664-93-9P, Sulfuric acid, preparation 8014-95-7P, Oleum  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (method for prepg. ~~sulfur trioxide~~, sulfuric  
 acid, and oleum from sulfur dioxide)  
 IT 7446-09-5, Sulfur dioxide, reactions 7704-34-9, Sulfur,  
 reactions 7782-44-7, Oxygen, reactions  
 RL: RCT (Reactant); ~~RACT (Reactant or reagent)~~  
 (method for prepg. ~~sulfur trioxide~~, sulfuric  
 acid, and oleum from sulfur dioxide)  
 IT 78-46-6, Dibutyl butyl phosphonate 4353-28-0, Tetraethylene glycol  
 diethyl ether  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (method for prepg. ~~sulfur trioxide~~, sulfuric  
 acid, and oleum from sulfur dioxide)  
 IT 7631-86-9, Silica, uses  
 RL: CAT (Catalyst use); TEM (Technical or engineered material use);  
 USES (Uses)  
 (support; method for prepg. ~~sulfur trioxide~~,  
 sulfuric acid, and oleum from sulfur dioxide)  
 RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

AN 133:82778 HCA Full-text  
 TI In situ chemical generator and method for using it to fabricate  
 semiconductor devices  
 IN Bar-Gadda, Ronny  
 PA Ronal Systems Corporation, USA  
 SO PCT Int. Appl., 25 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA English  
 FAN.CNT 3

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	----	-----	
PI	WO 2000040776	A1	20000713	WO 2000-US231	200001 04
				<--	
	W: JP, KR, SG RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
US	6579805	B1	20030617	US 1999-225922	199901 05
				<--	
TW	439105	B	20010607	TW 2000-89100067	200001 04
				<--	
EP	1155164	A1	20011121	EP 2000-902332	200001 04
				<--	
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
JP	2002534787	T	20021015	JP 2000-592468	200001 04
				<--	
KR	755122	B1	20070904	KR 2001-708564	200107 05
				<--	
US	20030170153	A1	20030911	US 2003-336483	200301 03
				<--	
US	6800559	B2	20041005		

PRAI US 1999-225922 A 19990105 <--  
 WO 2000-US231 W 20000104 <--  
 AB Chem. generator and method for generating a chem. species at a point of use such as the chamber of a reactor in which a workpiece such as a semiconductor wafer is to be processed. The species is generated by creating free radicals, and combining the free radicals to form the chem. species at the point of use.  
 IT 7446-09-5, Sulfur dioxide, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (SO3 formation from SO2)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (CA INDEX NAME)



IT 7446-11-9F, Sulfur oxide (SO3), preparation  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (SO3 formation from SO2)  
 RN 7446-11-9 HCA  
 CN Sulfur trioxide (CA INDEX NAME)



IT 7664-93-9F, Sulfuric acid, preparation  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (chem. generation of)  
 RN 7664-93-9 HCA  
 CN Sulfuric acid (CA INDEX NAME)



IT 7782-44-7, Oxygen, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (formation of nitric oxide from)

RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)

O==O

IC ICM C23F001-02  
ICS H01L021-3065  
CC 76-3 (Electric Phenomena)  
Section cross-reference(s): 48  
IT 7446-09-5, Sulfur dioxide, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(SO3 formation from SO2)  
IT 7446-11-9P, Sulfur oxide (SO3), preparation  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(SO3 formation from SO2)  
IT 7631-86-9P, Silica, preparation 7647-01-0P, Hydrogen chloride,  
preparation 7664-39-3P, Hydrogen fluoride, preparation  
7664-93-9P, Sulfuric acid, preparation 7697-37-2P, Nitric  
acid, preparation  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(chem. generation of)  
IT 7727-37-9, Nitrogen, reactions 7782-44-7, Oxygen,  
reactions 10102-44-0, Nitrogen dioxide, reactions 12385-13-6,  
Atomic hydrogen, reactions 17778-88-0, Atomic nitrogen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(formation of nitric oxide from)  
RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT  
  
L25 ANSWER 6 OF 16 HCA COPYRIGHT 2008 ACS on STN  
AN 128:259056 HCA Full-text  
OREF 128:51259a,51262a  
TI Environmentally safe process for the production of sulfuric acid  
AU Kobayakov, A. I.; Kobyakov, A. A.  
CS Ufa State Univ. Petroleum Engineering, Ufa, Russia  
SO Theoretical Foundations of Chemical Engineering (Translation of  
Teoreticheskie Osnovy Khimicheskoi Tekhnologii) (1998),  
32(2), 182-189  
CODEN: TFCEAU; ISSN: 0040-5795  
PB MAIK Nauka/Interperiodica Publishing  
DT Journal  
LA English  
AB A process flow sheet for the prodn. of sulfuric acid with waste gas  
recycling is analyzed. Operations of the closed system are studied

by a computational expt. New methods of recovering sulfur dioxide from waste gases are described.

IT 7664-93-9P, Sulfuric acid, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(environmentally safe process for sulfuric acid prodn.)  
RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7,  
Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(environmentally safe process for sulfuric acid prodn.)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (CA INDEX NAME)



RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)



CC 49-2 (Industrial Inorganic Chemicals)  
Section cross-reference(s): 48, 59  
IT Absorption  
Environmental pollution  
Oxidation  
Waste gases  
(environmentally safe process for sulfuric acid prodn.)  
IT 7664-93-9P, Sulfuric acid, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(environmentally safe process for sulfuric acid prodn.)  
IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7,

Oxygen, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(environmentally safe process for sulfuric acid prodn.)

RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L25 ANSWER 7 OF 16 HCA COPYRIGHT 2008 ACS on STN

AN 128:3404 HCA Full-text

OREF 128:739a,742a

TI Kinetic modeling of the photooxidation of dimethyl disulfide in the liquid phase

AU Robert-Banchereau, Evelyne; Lacombe, Sylvie; Ollivier, Jean; Micheau, Jean Claude; Lavabre, Dominique

CS Laboratoire de Physico-Chimie Moleculaire, UMR 5624, University of PAU, Pau, F-64000, Fr.

SO International Journal of Chemical Kinetics (1997), 29(11), 825-834

CODEN: IJCKBO; ISSN: 0538-8066

PB Wiley

DT Journal

LA English

AB A reaction mechanism for the photooxidn. of di-Me disulfide (DMDS) in aq. acetonitrile has been established by kinetic modeling the UV absorbance vs. time curves under continuous irradiation. The model, built according to the known solution reactivity of oxygensulfur radicals [1], consists of 22 steps involving 6 radical and 10 nonradical species. The first steps of the mechanism are the homolytic cleavage of the DMDS S-S bond with formation of methanethiyl radicals (CH<sub>3</sub>S $\cdot$ ) followed by addition of these radicals to mol. oxygen. There are photoequilibrium between thiyl (CH<sub>3</sub>S $\cdot$ ) sulfinyl (CH<sub>3</sub>SO $\cdot$ ) and sulfonyl (CH<sub>3</sub>SO<sub>2</sub> $\cdot$ ) radicals and the corresponding mol. species (Me methanethiosulfinate CH<sub>3</sub>S(O)SCH<sub>3</sub> or MMTSI, Me methanethiosulfonate CH<sub>3</sub>S(O)<sub>2</sub>SCH<sub>3</sub> or MMTS and methanesulfinic acid CH<sub>3</sub>S(O)OH or MSIA) which appear as long lived intermediates. Reactions of sulfonyl radicals with oxygen lead to methanesulfonic acid (CH<sub>3</sub>S(O)<sub>2</sub>OH) or MSA. Cleavage of sulfonyl radicals gives SO<sub>2</sub> and CH<sub>3</sub>. the parent compounds of sulfuric (H<sub>2</sub>SO<sub>4</sub>) and methanoic (HCOOH) acids. The predictive power of the model was tested at higher initial concentration of DMDS in anhydrous and aq. acetonitrile. In these conditions, the proposed mechanism gives a semiquantitative description of the course of the reaction and reproduces the kinetic behavior of the long lived intermediates.

IT 7446-09-5, Sulfur dioxide, reactions

RL: FMU (Formation, unclassified); PEP (Physical, engineering or chemical process); PRP (Properties); RCT (Reactant); FORM (Formation, nonpreparative); PROC (Process); RACT (Reactant or reagent)

(kinetic modeling of photooxidn. of di-Me disulfide in the liq.  
phase)

RN 7446-09-5 HCA

CN Sulfur dioxide (CA INDEX NAME)



IT 7782-44-7, Oxygen, reactions

RL: PEP (Physical, engineering or chemical process); PRP  
(Properties); RCT (Reactant); PROC (Process); RACT (Reactant or  
reagent)

(kinetic modeling of photooxidn. of di-Me disulfide in the liq.  
phase)

RN 7782-44-7 HCA

CN Oxygen (CA INDEX NAME)



IT 7664-93-9F, Sulfuric acid, preparation

RL: SPN (Synthetic preparation); PREP (Preparation)

(kinetic modeling of photooxidn. of di-Me disulfide in the liq.  
phase)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



CC 22-7 (Physical Organic Chemistry)

IT 50-00-0, Methanal, reactions 75-75-2, Methanesulfonic acid  
2229-07-4, Methyl radical 2949-92-0 4853-80-9, Methylsulfonyl  
radical 7175-75-9, Methylthio radical 7446-09-5, Sulfur  
dioxide, reactions 13882-12-7, Methyl methanethiosulfinate  
17696-73-0, Methanesulfinic acid 25683-64-1, Methylsulfinyl  
radical

RL: FMU (Formation, unclassified); PEP (Physical, engineering or

chemical process); PRP (Properties); RCT (Reactant); FORM (Formation, nonpreparative); PROC (Process); RACT (Reactant or reagent)

(kinetic modeling of photooxidn. of di-Me disulfide in the liq. phase)

IT 624-92-0, Dimethyl disulfide 7782-44-7, Oxygen, reactions  
RL: PEP (Physical, engineering or chemical process); PRP (Properties); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)

(kinetic modeling of photooxidn. of di-Me disulfide in the liq. phase)

IT 64-18-6P, Formic acid, preparation 7664-93-9P, Sulfuric acid, preparation

RL: SPN (Synthetic preparation); PREP (Preparation)

(kinetic modeling of photooxidn. of di-Me disulfide in the liq. phase)

RE.CNT 38 THERE ARE 38 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L25 ANSWER 8 OF 16 HCA COPYRIGHT 2008 ACS on STN

AN 125:237192 HCA Full-text

OREF 125:44024a

TI Method of generating sulfuric acid mist and apparatus therefor

IN Inoe, Shigeru; Yamashita, Koichi; Ootsuki, Takashi

PA Toyota Motor Co Ltd, Japan; Besuto Sotsuki Kk

SO Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 08178911	A	19960712	JP 1994-318396	
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199412  
21

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JP 3234424 B2 20011204

PRAI JP 1994-318396 19941221 <--

AB The process comprises a mixing a SO<sub>2</sub> gas and an O gas contg. moisture, heating the gas mixt., contacting an oxidn. catalyst to generate a predetd. concn. of sulfuric acid mist. Moisture is supplied by using a bubbler. The SO<sub>2</sub> and O gas flows are controlled by mass flow controllers, resp. The process is used for checking accuracy of a SOSx analyzer.

IT 7446-11-9P, Sulfur trioxide, reactions

RL: PNU (Preparation, unclassified); RCT (Reactant); PREP

(Preparation); RACT (Reactant or reagent)

(method of generating sulfuric acid mist and app. therefor)

RN 7446-11-9 HCA

CN Sulfur trioxide (CA INDEX NAME)



IT 7664-93-9F, Sulfuric acid, uses

RL: PNU (Preparation, unclassified); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(method of generating sulfuric acid mist and app. therefor)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7,  
Oxygen, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(method of generating sulfuric acid mist and app. therefor)

RN 7446-09-5 HCA

CN Sulfur dioxide (CA INDEX NAME)



RN 7782-44-7 HCA

CN Oxygen (CA INDEX NAME)



IC ICM G01N031-00

ICS G01N001-00

CC 80-7 (Organic Analytical Chemistry)  
IT 7446-11-9F, Sulfur trioxide, reactions  
RL: PNU (Preparation, unclassified); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(method of generating sulfuric acid mist and app. therefor)  
IT 7664-93-9F, Sulfuric acid, uses  
RL: PNU (Preparation, unclassified); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(method of generating sulfuric acid mist and app. therefor)  
IT 7446-09-5, Sulfur dioxide, reactions 7732-18-5, Water,  
reactions 7782-44-7, Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(method of generating sulfuric acid mist and app. therefor)

L25 ANSWER 9 OF 16 HCA COPYRIGHT 2008 ACS on STN

AN 123:238719 HCA Full-text

OREF 123:42447a,42450a

TI Deactivation and compound formation in sulfuric acid catalysts and  
model systems

AU Eriksen, K. M.; Karydis, D. A.; Boghosian, S.; Fehrmann, R.

CS Chemistry Department A, The Technical University of Denmark, Lyngby,  
DK-2800, Den.

SO Journal of Catalysis (1995), 155(1), 32-42

CODEN: JCTLA5; ISSN: 0021-9517

PB Academic

DT Journal

LA English

AB The catalytic deactivation and the simultaneous formation of compds.  
in industrial sulfuric acid catalysts and their molten salt-gas model  
systems M2S2O7/V2O5-SO2/O2/SO3/N2 (M = Na, K, Cs) have been studied  
by combined activity measurements and in situ ESR spectroscopy at  
temps. up to 500°C. The applied gas compns. were unconverted, and 50  
and 90% preconverted std. feed gas contg. 10% SO2, 11% O2, and 79%  
N2. This covers the conditions of all beds in an industrial SO2  
converter, without interstage absorption of SO3. The temp. of  
deactivation was shown to decrease with increased degree of  
preconversion of the feed gas, increased mixing of the alkali  
promoters, and decreased vanadium content in the catalysts and model  
systems. The pptn. of V(III), V(IV), and mixed valence V(IV)-V(V)  
compds. was obsd. below the onset temp. of the catalyst deactivation.  
The salts have been isolated under operating conditions from model  
melts and identified by microscopy and spectroscopic methods. The  
V(IV) compds. were characterized by ESR spectroscopy and their temp.  
of decompn. was found to be in the range 450-500°C. Based on the  
characteristic ESR spectra, the V(IV) compds. causing the  
deactivation of working industrial catalysts could be identified in  
situ. Finally, it was found that the restoration of deactivated

catalysts requires heating to around 500°C, where the low-valence vanadium compds. decomp. and reoxidize to V(V).

IT 7664-93-9F, Sulfuric acid, preparation

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)

(deactivation and compd. formation in sulfuric acid catalysts and model systems)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



IT 7446-09-5, Sulfur dioxide, reactions 7446-11-9,

Sulfur trioxide, reactions 7782-44-7,

Oxygen, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(deactivation and compd. formation in sulfuric acid catalysts and model systems)

RN 7446-09-5 HCA

CN Sulfur dioxide (CA INDEX NAME)



RN 7446-11-9 HCA

CN Sulfur trioxide (CA INDEX NAME)



RN 7782-44-7 HCA

CN Oxygen (CA INDEX NAME)



CC 67-1 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)  
 Section cross-reference(s): 49  
 IT 7664-93-9F, Sulfuric acid, preparation  
 RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)  
 (deactivation and compd. formation in sulfuric acid catalysts and model systems)  
 IT 7446-09-5, Sulfur dioxide, reactions 7446-11-9,  
 Sulfur trioxide, reactions 7782-44-7,  
 Oxygen, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (deactivation and compd. formation in sulfuric acid catalysts and model systems)

L25 ANSWER 10 OF 16 HCA COPYRIGHT 2008 ACS on STN

AN 123:87456 HCA [Full-text](#)

OREF 123:15565a,15568a

TI Process for recovering sulfuric acid from sulfate-containing used acid

IN Lailach, Guenter Dr

PA Bayer A.-G., Germany

SO Ger. Offen., 6 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	DE 4437550	A1	19950504	DE 1994-4437550	199410 20

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PRAI DE 1994-4437550 A1 19941020 <--

DE 1993-4337010 19931029 <--

AB In this process, comprising increasing the H2SO4 concn. to 50-75% by evapn., crystg. and removing the sulfates, thermally decomp. the moist sulfates oxides and SO2-contg. gases, cooling the SO2-contg. gases and oxides to 270-320°, dedusting the SO2-contg. hot gases, scrubbing and cooling the SO2-contg. dust-free gases to 25-40°, sepg. mist from the gases, drying the gases with 95-98% H2SO4, converting the SO2-contg. gases with O to SO3, and absorbing the SO3 to obtain H2SO4, the dedusted SO2- and 7-20-vol.% water vapor-contg. hot gases are scrubbed and cooled with 60-80-wt.% H2SO4 of 120-160° that is recirculated through a heat exchanger, and cooled to 25-40° by direct

or indirect heat exchange with a cooling liq., such that the heat from the SO<sub>2</sub>-contg. hot gases is transferred to the sulfate-contg. used acid.

IT 7446-11-9P, Sulfur trioxide, preparation  
RL: PNU (Preparation, unclassified); PREP (Preparation)  
(sulfuric acid recovery from sulfate-contg. used acid)  
RN 7446-11-9 HCA  
CN Sulfur trioxide (CA INDEX NAME)



IT 7446-09-5P, Sulfur dioxide, preparation  
RL: PNU (Preparation, unclassified); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(sulfuric acid recovery from sulfate-contg. used acid)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (CA INDEX NAME)



IT 7664-93-9P, Sulfuric acid, preparation  
RL: PUR (Purification or recovery); PREP (Preparation)  
(sulfuric acid recovery from sulfate-contg. used acid)  
RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



IT 7782-44-7, Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(sulfuric acid recovery from sulfate-contg. used acid)  
RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)

IC ICM C01B017-90  
ICS C01B017-88; C01B017-76

CC 49-1 (Industrial Inorganic Chemicals)

IT 7446-11-9P, Sulfur trioxide, preparation  
RL: PNU (Preparation, unclassified); PREP (Preparation)  
(sulfuric acid recovery from sulfate-contg. used acid)

IT 7446-09-5P, Sulfur dioxide, preparation  
RL: PNU (Preparation, unclassified); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(sulfuric acid recovery from sulfate-contg. used acid)

IT 7664-93-9P, Sulfuric acid, preparation  
RL: PUR (Purification or recovery); PREP (Preparation)  
(sulfuric acid recovery from sulfate-contg. used acid)

IT 7782-44-7, Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(sulfuric acid recovery from sulfate-contg. used acid)

L25 ANSWER 11 OF 16 HCA COPYRIGHT 2008 ACS on STN

AN 122:191601 HCA Full-text

OREF 122:35029a,35032a

TI Relation between conversion efficiencies and oxygen/sulfur dioxide ratios in 3 + 2-type two-fold conversion

AU Zhang, Chaolin

CS Nanhua (Group) Co. Res. Inst., Peop. Rep. China

SO Liusuan Gongye (1994), (2), 10-16, 60  
CODEN: LIGOEH

PB Liusuan Gongye Bianjibu

DT Journal

LA Chinese

AB A math. model for conversion efficiencies and O<sub>2</sub>/SO<sub>2</sub> ratios of 3 + 2 interpass **absorption** process was established on the basis of tests in a 20 k tons/yr H<sub>2</sub>SO<sub>4</sub> pilot plant. The regression and residual error anal. showed that the calcd. results were in good agreement with exptl. data. In 3 + 2 interpass **absorption** configuration, an overall conversion efficiency of ≥99.7% can be reached, provided that O<sub>2</sub>/SO<sub>2</sub> ratio is ≥0.766 no matter what kinds of pyrite supplies are used. In other words, H<sub>2</sub>SO<sub>4</sub> output can be raised with the same conversion efficiency by roasting high-grade pyrite which contains fewer O<sub>2</sub>-consuming impurities to increase inlet SO<sub>2</sub> concn. when O<sub>2</sub>/SO<sub>2</sub> ratio remains unchanged. The test showed that the overall conversion efficiency is also related to process arrangement. At the same

O2/SO2 ratio, the conversion efficiency order is  $3 + 2 > 3 + 1 > 2 + 2$ . At less O2/SO2 ratio, the difference is more evident.

IT 7664-93-9F, Sulfuric acid, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(relation between conversion efficiencies and oxygen/sulfur  
dioxide ratios in 3 + 2-type two-fold conversion)  
RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7,  
Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(relation between conversion efficiencies and oxygen/sulfur  
dioxide ratios in 3 + 2-type two-fold conversion)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (CA INDEX NAME)



RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)



CC 49-2 (Industrial Inorganic Chemicals)  
IT 7664-93-9F, Sulfuric acid, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(relation between conversion efficiencies and oxygen/sulfur  
dioxide ratios in 3 + 2-type two-fold conversion)  
IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7,  
Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(relation between conversion efficiencies and oxygen/sulfur

dioxide ratios in 3 + 2-type two-fold conversion)

L25 ANSWER 12 OF 16 HCA COPYRIGHT 2008 ACS on STN  
AN 108:228094 HCA Full-text  
OREF 108:37321a,37324a  
TI Corrosion by photochemical reaction due to synchrotron radiation in  
TRISTAN accumulation ring  
AU Momose, Takashi; Ishimaru, Hajime  
CS Natl. Lab. for High Energy Phys., Tsukuba, Japan  
SO Shinku (1988), 31(1), 18-20  
CODEN: SHINAM; ISSN: 0559-8516  
DT Journal  
LA Japanese  
AB Corrosion of Al alloy in the TRISTAN accumulation ring (TAR) is  
caused by HNO3 and H2SO4 formed by the synchrotron radiation irradiation  
of the N, O, SO2 in air and resulted in the formation of NO, NO2, and  
SO3 which then reacted with moisture to form HNO3 and H2SO4. The  
humidity in the TAR was 60%. Controlling the humidity might be a way  
of controlling corrosion.  
IT 7664-93-9P, preparation  
RL: PREP (Preparation)  
(formation and corrosion of aluminum alloy by, in accelerator  
accumulation ring in presence of synchrotron radiation)  
RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



IT 7446-11-9P, preparation  
RL: FORM (Formation, nonpreparative); PREP (Preparation)  
(formation of, in accelerator accumulation ring, aluminum alloy  
corrosion in relation to)  
RN 7446-11-9 HCA  
CN Sulfur trioxide (CA INDEX NAME)



IT 7446-09-5, reactions 7782-44-7, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(radiolysis of, by synchrotron radiation in accelerator  
accumulation ring, aluminum alloy corrosion in relation to)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (CA INDEX NAME)



RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)



CC 71-1 (Nuclear Technology)  
Section cross-reference(s): 74  
IT 7664-93-9P, preparation 7697-37-2P, preparation  
RL: PREP (Preparation)  
(formation and corrosion of aluminum alloy by, in accelerator  
accumulation ring in presence of synchrotron radiation)  
IT 7446-11-9P, preparation 10102-43-9P, preparation  
10102-44-0P, preparation  
RL: FORM (Formation, nonpreparative); PREP (Preparation)  
(formation of, in accelerator accumulation ring, aluminum alloy  
corrosion in relation to)  
IT 7446-09-5, reactions 7727-37-9, reactions  
7782-44-7, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(radiolysis of, by synchrotron radiation in accelerator  
accumulation ring, aluminum alloy corrosion in relation to)

L25 ANSWER 13 OF 16 HCA COPYRIGHT 2008 ACS on STN

AN 105:216541 HCA Full-text

OREF 105:34773a,34776a

TI Conversion of sulfur dioxide to sulfur trioxide  
facilitated by in situ UV photolysis of formaldehyde and sulfur  
dioxide in an oxygen matrix at 12 K

AU Green, Martina; Lee, Edward K. C.

CS Dep. Chem., Univ. California, Irvine, CA, 92717, USA

SO Journal of Physical Chemistry (1986), 90(24), 6470-5

CODEN: JPCHAX; ISSN: 0022-3654

DT Journal  
 LA English  
 AB The photooxidn. product distributions from photolyses of H<sub>2</sub>CO and H<sub>2</sub>CO.SO<sub>2</sub> mol. complexes in O matrixes at  $\lambda = 270-420$  nm are compared. Photodissocn. of H<sub>2</sub>CO produced RO<sub>2</sub> species (HO<sub>2</sub> and HC(O)OO radicals) which then efficiently oxidized SO<sub>2</sub> to SO<sub>3</sub> (and H<sub>2</sub>SO<sub>4</sub>). This process occurred with an efficiency of  $\text{apprx.} 0.7 \pm 0.3$  per H<sub>2</sub>CO.SO<sub>2</sub> mol. complex photodissocd. Various photooxidn. mechanisms are considered. Implications of the low-temp./matrix photooxidn. results on atm. photooxidn. of SO<sub>2</sub> by RO<sub>2</sub> species are discussed.

IT 7446-11-9P, preparation 7664-93-9P, preparation  
 RL: FORM (Formation, nonpreparative); PREP (Preparation)  
 (formation of, in photolysis of oxygen matrix contg. sulfur dioxide and formaldehyde)

RN 7446-11-9 HCA  
 CN Sulfur trioxide (CA INDEX NAME)



RN 7664-93-9 HCA  
 CN Sulfuric acid (CA INDEX NAME)



IT 7782-44-7, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (photolysis of matrix from, contg. sulfur dioxide and formaldehyde)

RN 7782-44-7 HCA  
 CN Oxygen (CA INDEX NAME)



IT 7446-09-5, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
 (photolysis of, in oxygen matrix contg. formaldehyde)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (CA INDEX NAME)

O=S=O

CC 74-1 (Radiation Chemistry, Photochemistry, and Photographic and  
 Other Reprographic Processes)  
 IT 3170-83-0P 7446-11-9P, preparation 7664-93-9P,  
 preparation 56240-83-6P  
 RL: FORM (Formation, nonpreparative); PREP (Preparation)  
 (formation of, in photolysis of oxygen matrix contg. sulfur  
 dioxide and formaldehyde)  
 IT 7782-44-7, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (photolysis of matrix from, contg. sulfur dioxide and  
 formaldehyde)  
 IT 7446-09-5, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (photolysis of, in oxygen matrix contg. formaldehyde)

L25 ANSWER 14 OF 16 HCA COPYRIGHT 2008 ACS on STN  
 AN 89:8407 HCA Full-text  
 OREF 89:1383a,1386a  
 TI Sulfuric acid manufacture using dispersed asbestos  
 IN Iida, Akira  
 PA Taniguchi, Akira, Japan  
 SO Jpn. Tokkyo Koho, 8 pp.  
 CODEN: JAXXAD  
 DT Patent  
 LA Japanese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	
PI	JP 52030160	B	19770805	JP 1973-68298	197306 19
				<--	
	JP 50018385	A	19750226		
PRAI	JP 1973-68298		19730619	<--	

AB H2SO4 in manufd. by bubbling a SO2-contg. gas into an aq. suspension of asbestos (contg. large amts. of adsorbed O), heating the suspension to 70-100°, then filtering off the asbestos.

IT 7664-93-9P, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (manuf. of, sulfur dioxide oxidn. by oxygen absorbed on asbestos in)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



IT 7782-44-7, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (oxidn. by asbestos-absorbed, of sulfur dioxide)

RN 7782-44-7 HCA

CN Oxygen (CA INDEX NAME)



IT 7446-09-5, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (oxidn. of, by oxygen absorbed on asbestos)

RN 7446-09-5 HCA

CN Sulfur dioxide (CA INDEX NAME)



IC C01B017-74

CC 49-2 (Industrial Inorganic Chemicals)

IT Asbestos  
 RL: USES (Uses)  
 (absorption by, of oxygen for sulfur dioxide oxidn.)

IT 7664-93-9P, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)

(manuf. of, sulfur dioxide oxidn. by oxygen **absorbed** on asbestos in)

IT 7782-44-7, reactions  
 RL: RCT (Reactant); **RACT** (Reactant or reagent)  
 (oxidn. by asbestos-**absorbed**, of sulfur dioxide)

IT 7446-09-5, reactions  
 RL: RCT (Reactant); **RACT** (Reactant or reagent)  
 (oxidn. of, by oxygen **absorbed** on asbestos)

L25 ANSWER 15 OF 16 HCA COPYRIGHT 2008 ACS on STN  
 AN 86:173661 HCA Full-text  
 OREF 86:27283a,27286a  
 TI Preparation of sulfuric acid from 18-22% sulfur dioxide  
 AU Epifanov, V. S.; Khryashchev, S. V.; Terent'ev, D. F.; Borisov, V. M.; Popov, A. E.; Safonov, A. V.  
 CS USSR  
 SO Khimicheskaya Promyshlennost (Moscow, Russian Federation) ( 1977), (2), 122-4  
 CODEN: KPRMAW; ISSN: 0023-110X  
 DT Journal  
 LA Russian  
 AB The use of air with supplemental O in the manuf. of H2SO4 from gases contg. 18-22% SO2 by the double contact-double **absorption** method. With supplemental O the energy consumption and equipment required were less than if no supplemental O was added. Also, as the SO2 concn. increased these values decreased.

IT 7664-93-9F, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (manuf. of, use of air plus oxygen in, energy consumption and equipment requirement redn. in)

RN 7664-93-9 HCA  
 CN Sulfuric acid (CA INDEX NAME)



IT 7446-09-5, reactions  
 RL: RCT (Reactant); **RACT** (Reactant or reagent)  
 (oxidn. of, use of air plus oxygen in, energy consumption and equipment requirements decrease by)

RN 7446-09-5 HCA  
 CN Sulfur dioxide (CA INDEX NAME)

O=S=O

IT 7782-44-7, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction of air and, with sulfur dioxide, energy consumption and  
equipment requirement redn. by)  
RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)

O=O

CC 49-2 (Industrial Inorganic Chemicals)  
IT 7664-93-9P, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manuf. of, use of air plus oxygen in, energy consumption and  
equipment requirement redn. in)  
IT 7446-09-5, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(oxidn. of, use of air plus oxygen in, energy consumption and  
equipment requirements decrease by)  
IT 7782-44-7, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction of air and, with sulfur dioxide, energy consumption and  
equipment requirement redn. by)  
L25 ANSWER 16 OF 16 HCA COPYRIGHT 2008 ACS on STN  
AN 84:22509 HCA Full-text  
OREF 84:3683a,3686a  
TI Kinetics of particle growth. VI. Sulfuric acid aerosol from the  
photooxidation of sulfur dioxide in moist oxygen-nitrogen mixtures  
AU Smith, Roland; De Pena, R. G.; Hecklen, Julian  
CS Cent. Air Environ. Stud., Pennsylvania State Univ., University Park,  
PA, USA  
SO Journal of Colloid and Interface Science (1975), 53(2),  
202-13  
CODEN: JCISA5; ISSN: 0021-9797  
DT Journal  
LA English  
AB SO2 was photolyzed by fluorescent light at 29° in moist O-N mixts. of  
1 atm pressure. The particle no. d. of the H2SO4 aerosol product was

monitored as a function of irradiation time. After 1-min induction period, particles were produced and they increased to a maximum value,  $N_{max}$ , of approximately  $0.6 \times 10^5$  particles/cm<sup>3</sup> at approximately 10 min irradiation time for an SO<sub>2</sub> photoremoval constant of  $3 \times 10^{-6}$  min<sup>-1</sup>. The results were independent of the SO<sub>2</sub> pressure or the H<sub>2</sub>O pressure, but  $N_{max}$  was smaller at reduced light intensity. The critical concentration of H<sub>2</sub>SO<sub>4</sub> vapor needed to initiate particle growth was approximately 109 mols./cm<sup>3</sup> ( $2 \times 10^{-7}$  torr). The nucleation mechanism is:  $SO_2 + h\nu \rightarrow SO_2^*$ ;  $SO_2^* + O_2 \rightarrow SO_4$ ;  $SO_4 + SO_2 \rightarrow 2SO_3$  (4);  $SO_3 + H_2O \rightarrow H_2SO_4$  (3);  $qSO_4 \rightarrow (SO_4)q$  (5); where  $SO_2^*$  is the electronically excited SO<sub>2</sub> molecule, that is the precursor to SO<sub>4</sub>. Reaction 5 is the nucleating reaction, and  $(SO_4)q$  is the nucleating species. Reaction 5 is slow compared to reaction 4, and the steady-state approximation leads to the law for the nucleation rate,  $R_{nucl} = k_5(k_1/k_4)q$ , where  $k_1$  is the photoremoval rate of SO<sub>2</sub>.

IT 7664-93-9F, properties

RL: PRP (Properties); PREP (Preparation)

(aerosols, kinetics of growth of, with formation by photooxidation of sulfur dioxide)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



IT 7446-09-5, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(photochemical oxidation of, in moist oxygen-nitrogen mixtures with formation of sulfuric acid aerosols)

RN 7446-09-5 HCA

CN Sulfur dioxide (CA INDEX NAME)



IT 7782-44-7, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(photooxidation of sulfur dioxide in moist nitrogen and)

RN 7782-44-7 HCA

CN Oxygen (CA INDEX NAME)

0=0

CC 66-1 (Surface Chemistry and Colloids)  
Section cross-reference(s): 74, 53  
IT 7664-93-9F, properties  
RL: PRP (Properties); PREP (Preparation)  
(aerosols, kinetics of growth of, with formation by photooxidn.  
of sulfur dioxide)  
IT 7446-09-5, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(photochem. oxidn. of, in moist oxygen-nitrogen mixts. with  
formation of sulfuric acid aerosols)  
IT 7782-44-7, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(photooxidn. of sulfur dioxide in moist nitrogen and)

=> D L26 1-7 BIB ABS HITSTR HITIND

L26 ANSWER 1 OF 7 HCA COPYRIGHT 2008 ACS on STN  
AN 133:60918 HCA Full-text  
TI Waste gas analysis system and manufacture of sulfuric acid from  
smelting waste gas using same.  
IN Noda, Tsutomu; Kondo, Etsuo; Shinohara, Masahiko; Sato, Hiroshi  
PA Sumitomo Metal Mining Co., Ltd., Japan  
SO Jpn. Kokai Tokkyo Koho, 5 pp.  
CODEN: JKXXAF

DT Patent  
LA Japanese  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	
PI	JP 2000191306	A	20000711	JP 1998-369345	

199812  
25

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PRAI JP 1998-369345 19981225 <--  
AB The title anal. system comprises an introduction piping connected  
with the outlet of a booster blower, a gas purifn. device, a reducing  
valve, a continuous automatic analyzer, and a discharge piping  
connected to the inlet of a drying tower; the introduction piping and  
the discharge piping are connected with the gas purifn. device resp.;

the gas purifn. device and the continuous automatic analyzer are connected via the reducing valve. The sulfuric acid manuf. process includes using the above stated anal. system to find SO2 concn. and O2 concn. in waste gas; if necessary, diln. air is added into waste gas for properly adjusting the ratio of SO2 concn. and O2 concn. in waste gas based on the anal. result.

IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7,  
Oxygen, reactions  
RL: ANT (Analyte); RCT (Reactant); ANST (Analytical study);  
RACT (Reactant or reagent)  
(waste gas anal. system and manuf. of sulfuric acid from smelting  
waste gas using same)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (CA INDEX NAME)



RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)



IT 7664-93-9F, Sulfuric acid, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(waste gas anal. system and manuf. of sulfuric acid from smelting  
waste gas using same)  
RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



IC ICM C01B017-765  
ICS C01B017-74; G01N001-22; G01N031-00; G01N031-22  
CC 49-3 (Industrial Inorganic Chemicals)  
Section cross-reference(s): 55, 56, 59, 79

IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7,  
Oxygen, reactions  
RL: ANT (Analyte); RCT (Reactant); ANST (Analytical study);  
RACT (Reactant or reagent)  
(waste gas anal. system and manuf. of sulfuric acid from smelting  
waste gas using same)

IT 7664-93-9P, Sulfuric acid, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(waste gas anal. system and manuf. of sulfuric acid from smelting  
waste gas using same)

L26 ANSWER 2 OF 7 HCA COPYRIGHT 2008 ACS on STN

AN 132:224458 HCA Full-text

TI Sulfuric acid conversion process

IN Hakka, Leo E.; Parisi, Paul J.

PA Cansolv Technologies Inc., Can.

SO PCT Int. Appl., 34 pp.

CODEN: PIXXD2

DT Patent

LA English

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000014011	A1	20000316	WO 1999-CA796	19990902
<p>W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM</p> <p>RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG</p>				
CA 2246474	A1	20000303	CA 1998-2246474	19980903
<p>AU 9954040</p>				
<p>CA 1998-2246474</p>				
<p>US 1998-148852</p>				

WO 1999-CA796 W 19990902 <--

AB A process for prodn. of H<sub>2</sub>SO<sub>4</sub> comprises (1) providing a H<sub>2</sub>SO<sub>4</sub> precursor stream comprising O<sub>2</sub> and SO<sub>2</sub>; (2) feeding the H<sub>2</sub>SO<sub>4</sub> stream to a H<sub>2</sub>SO<sub>4</sub> converter to produce a H<sub>2</sub>SO<sub>4</sub> stream and a gaseous stream contg. unreacted SO<sub>2</sub>; and (3) subjecting the gaseous stream to a regenerable SO<sub>2</sub> recovery process to obtain a SO<sub>2</sub>-rich stream and a SO<sub>2</sub>-lean stream.

IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7, Oxygen, reactions  
 RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)  
 (in sulfuric acid manuf.)

RN 7446-09-5 HCA

CN Sulfur dioxide (CA INDEX NAME)



RN 7782-44-7 HCA

CN Oxygen (CA INDEX NAME)



IT 7664-93-9F, Sulfuric acid, preparation  
 RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)  
 (manuf. of)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



IC ICM C01B017-76

CC 49-2 (Industrial Inorganic Chemicals)

IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7, Oxygen, reactions

RL: PEP (Physical, engineering or chemical process); RCT (Reactant);  
PROC (Process); **RACT (Reactant or reagent)**  
(in sulfuric acid manuf.)

IT 7664-93-9P, Sulfuric acid, preparation  
RL: IMF (Industrial manufacture); PEP (Physical, engineering or  
chemical process); PREP (Preparation); PROC (Process)  
(manuf. of)

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L26 ANSWER 3 OF 7 HCA COPYRIGHT 2008 ACS on STN

AN 128:283877 HCA Full-text

OREF 128:56179a,56182a

TI Photochemical process for the manufacture of methanesulfonic acid  
from mixtures of acetic acid and sulfur dioxide and oxygen

IN Eiermann, Matthias; Papkalla, Thomas

PA BASF Aktiengesellschaft, Germany; Eiermann, Matthias; Papkalla,  
Thomas

SO PCT Int. Appl., 15 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	
PI	WO 9815527	A1	19980416	WO 1997-EP5536	199710 08

<--

W: CA, JP, MX, US

RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL,  
PT, SE

DE	19641483	A1	19980416	DE 1996-19641483	199610 09
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EP	932599	A1	19990804	EP 1997-911197	199710 08
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EP	932599	B1	20010822		
	R: BE, DE, FR, GB, IT				
JP	2001501942	T	20010213	JP 1998-517181	199710 08

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PRAI DE 1996-19641483 A 19961009 <--  
WO 1997-EP5536 W 19971008 <--  
AB Methanesulfonic acid is prepd. in high yield and selectivity by UV  
irradn. of a mixt. contg. acetic acid, sulfur dioxide, and oxygen. An  
accumulated irradn. d. of 240-320 nm light on the light-entrance  
surface of the reaction mixt. of 0.05-50 nmole-quantum/cm2-h is used.  
IT 7664-93-9P, Sulfuric acid, preparation  
RL: BYP (Byproduct); PREP (Preparation)  
(photochem. process for the manuf. of methanesulfonic acid from  
mixts. of acetic acid and sulfur dioxide and oxygen)  
RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



IT 7446-09-5, Sulfur dioxide, reactions 7782-44-7,  
Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(photochem. process for the manuf. of methanesulfonic acid from  
mixts. of acetic acid and sulfur dioxide and oxygen)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (CA INDEX NAME)



RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)



IC ICM C07C303-14

ICS C07C309-04

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)

Section cross-reference(s): 23, 48, 74

IT 7664-93-9P, Sulfuric acid, preparation

RL: BYP (Byproduct); PREP (Preparation)

(photochem. process for the manuf. of methanesulfonic acid from mixts. of acetic acid and sulfur dioxide and oxygen)

IT 64-19-7, Acetic acid, reactions 7446-09-5, Sulfur dioxide, reactions 7782-44-7, Oxygen, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(photochem. process for the manuf. of methanesulfonic acid from mixts. of acetic acid and sulfur dioxide and oxygen)

RE.CNT 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD

ALL CITATIONS AVAILABLE IN THE RE FORMAT

L26 ANSWER 4 OF 7 HCA COPYRIGHT 2008 ACS on STN

AN 112:182365 HCA Full-text

OREF 112:30813a,30816a

TI Method and apparatus for the desulfurization of sulfur dioxide-containing gases under formation of sulfuric acid

IN Lailach, Guenter; Gerken, Rudolf

PA Bayer A.-G., Germany

SO Ger. Offen., 4 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	
PI	DE 3826372	A1	19900222	DE 1988-3826372	19880803
				<--	
	EP 356693	A2	19900307	EP 1989-113419	19890721
				<--	
	EP 356693	A3	19900321		

R: BE, DE, ES, FR, GB, IT, NL

PRAI DE 1988-3826372 A 19880803 <--

AB In the title process, comprising reacting the SO<sub>2</sub> with O and water on moistened, activated C at 40-90°, 7-100 g H<sub>2</sub>O are nebulized per 1 g SO<sub>2</sub> in the SO<sub>2</sub>-contg. gases having a H<sub>2</sub>O-vapor satn. of ≥90%. The app. consists of a vertical multicompartement reactor having circular or rectangular cross-sectional area, in which the activated C beds are supported by gas-permeable supports, and in which the reactor

wall above the beds contain openings for the introduction of the SO<sub>2</sub>- and water droplet-contg. gas, and openings under the beds for the removal of the desulfurized gas and the H<sub>2</sub>SO<sub>4</sub>. This method and app. give improved utilization of the reactor vol. at decreased free space.

IT 7664-93-9P, Sulfuric acid, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manuf. of, from sulfur dioxide in flue gases, by oxidn. on  
moistened activated carbon, app. for)  
RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



IT 7446-09-5, Sulfur dioxide, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(oxidn. of, in flue gases, on moistened activated carbon, for  
sulfuric acid, app. for)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (CA INDEX NAME)



IT 7782-44-7, Oxygen, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(oxidn. with, of sulfur dioxide, in flue gases, on moistened  
activated carbon, for sulfuric acid, app. for)  
RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)



IC ICM B01D053-34  
ICS B01D053-14; C01B017-69  
CC 49-2 (Industrial Inorganic Chemicals)

IT 7664-93-9F, Sulfuric acid, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (manuf. of, from sulfur dioxide in flue gases, by oxidn. on  
 moistened activated carbon, app. for)

IT 7446-09-5, Sulfur dioxide, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (oxidn. of, in flue gases, on moistened activated carbon, for  
 sulfuric acid, app. for)

IT 7782-44-7, Oxygen, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (oxidn. with, of sulfur dioxide, in flue gases, on moistened  
 activated carbon, for sulfuric acid, app. for)

L26 ANSWER 5 OF 7 HCA COPYRIGHT 2008 ACS on STN

AN 111:236065 HCA Full-text

OREF 111:39187a,39190a

TI Apparatus for the manufacture of sulfuric acid by the contact  
 process

IN Ukawa, Naohiko; Nakamura, Tsumoru; Kotake, Shinichiro

PA Mitsubishi Heavy Industries, Ltd., Japan

SO Ger. Offen., 6 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO. ----- -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
PI	DE 3911889	A1	19891019	DE 1989-3911889	198904 07
				<--	
	JP 01257110	A	19891013	JP 1988-84105	198804 07
				<--	
	JP 07108767	B	19951122		
	AU 8932428	A	19891012	AU 1989-32428	198904 04
				<--	
	AU 610374	B2	19910516		
	CA 1332783	C	19941101	CA 1989-595960	198904 06
				<--	
PRAI	JP 1988-84105	A	19880407	<--	

AB The title app. comprises a piping system for supplying the SO<sub>2</sub> and O<sub>2</sub>, contg. multiple honeycomb-type grids of catalytic material having equiv. diam. 3.0-15.0 mm and open vol. 30-70%, sepd. by heat exchangers. The app. has low pressure drop.

IT 7664-93-9P, Sulfuric acid, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (manuf. of, app. for, with honeycomb-type catalyst grids)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



IT 7446-09-5, Sulfur dioxide, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (reaction of, with oxygen, honeycomb-type catalyst grids for, in sulfuric acid manuf.)

RN 7446-09-5 HCA

CN Sulfur dioxide (CA INDEX NAME)



IT 7782-44-7, Oxygen, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (reaction of, with sulfur dioxide, honeycomb-type catalyst grids for, in sulfuric acid manuf.)

RN 7782-44-7 HCA

CN Oxygen (CA INDEX NAME)



IC ICM C01B017-76  
 ICS B01J035-04

CC 49-2 (Industrial Inorganic Chemicals)  
 Section cross-reference(s): 47

IT 7664-93-9P, Sulfuric acid, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)  
 (manuf. of, app. for, with honeycomb-type catalyst grids)  
 IT 7446-09-5, Sulfur dioxide, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (reaction of, with oxygen, honeycomb-type catalyst grids for, in  
 sulfuric acid manuf.)  
 IT 7782-44-7, Oxygen, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (reaction of, with sulfur dioxide, honeycomb-type catalyst grids  
 for, in sulfuric acid manuf.)  
 L26 ANSWER 6 OF 7 HCA COPYRIGHT 2008 ACS on STN  
 AN 105:234486 HCA Full-text  
 OREF 105:37745a,37748a  
 TI The study of the sulfur dioxide conversion for the sulfuric  
 acid-hydrogen production process  
 AU Stankovic, Z. D.  
 CS Fac. Eng. Bor, Univ. Beograd, Bor, 19210, Yugoslavia  
 SO Advances in Hydrogen Energy (1986), 5(Hydrogen Energy  
 Prog. 6, Vol. 1), 394-405  
 CODEN: AHENDB; ISSN: 0276-2412  
 DT Journal  
 LA English  
 AB The results of the depolarization effect of the anodic oxidn. of SO2  
 by O generated at packed bed electrodes on the process of  
 electrolysis of H2O for prodn. of H and H2SO4 are presented. By  
 using potential-time and current-potential measurements, the extent  
 of the depolarization effect of SO2 on the anodic potential of the  
 H2O electrolyzer was obtained.  
 IT 7446-09-5, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (oxidn. of, electrochem., in sulfuric acid-hydrogen prodn.  
 process)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (CA INDEX NAME)

0=S=0

IT 7664-93-9P, preparation  
 RL: PREP (Preparation)  
 (prodn. of, by sulfur dioxide conversion in hydrogen prodn.  
 process)  
 RN 7664-93-9 HCA  
 CN Sulfuric acid (CA INDEX NAME)



IT 7782-44-7, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (sulfur dioxide anodic oxidn. by, in sulfuric acid-hydrogen  
 prodn. process)  
 RN 7782-44-7 HCA  
 CN Oxygen (CA INDEX NAME)

O==O

CC 72-9 (Electrochemistry)  
 IT 7446-09-5, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (oxidn. of, electrochem., in sulfuric acid-hydrogen prodn.  
 process)  
 IT 7664-93-9P, preparation  
 RL: PREP (Preparation)  
 (prodn. of, by sulfur dioxide conversion in hydrogen prodn.  
 process)  
 IT 7782-44-7, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (sulfur dioxide anodic oxidn. by, in sulfuric acid-hydrogen  
 prodn. process)

L26 ANSWER 7 OF 7 HCA COPYRIGHT 2008 ACS on STN  
 AN 95:105177 HCA Full-text  
 OREF 95:17533a,17534a  
 TI Electrogenenerative oxidation of sulfur dioxide  
 AU Spotnitz, R. M.; Loeffler, C. E., II; Langer, S. H.  
 CS Dep. Chem. Eng., Univ. Wisconsin-Madison, Madison, WI, 53706, USA  
 SO Journal of Applied Electrochemistry (1981), 11(4), 403-5  
 CODEN: JAELEBJ; ISSN: 0021-891X  
 DT Journal  
 LA English  
 AB Possible applications of electrosynthesis of H2SO4 from SO2 and O are  
 discussed, and preliminary results for a lab. scale reactor are

presented. The use of active, fuel-cell electrodes enables relatively large current densities to be obtained at low cell voltages.

IT 7664-93-9P, preparation  
RL: PREP (Preparation)  
(electrosynthesis of, from sulfur dioxide and oxygen)  
RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



IT 7446-09-5, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(oxidn. of, electrogenerative)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (CA INDEX NAME)



IT 7782-44-7, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(sulfuric acid electrosynthesis from sulfur dioxide and)  
RN 7782-44-7 HCA  
CN Oxygen (CA INDEX NAME)



CC 72-2 (Electrochemistry)  
Section cross-reference(s): 49  
IT 7664-93-9P, preparation  
RL: PREP (Preparation)  
(electrosynthesis of, from sulfur dioxide and oxygen)  
IT 7446-09-5, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(oxidn. of, electrogenerative)

IT 7782-44-7, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(sulfuric acid electrosynthesis from sulfur dioxide and)